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INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS

Geneva

DRAFT

GINGER

UPOV Code(s): ZINGI_OFF

Zingiber officinale Rosc.

GUIDELINES

FOR THE CONDUCT OF TESTS

FOR DISTINCTNESS, UNIFORMITY AND STABILITY

*prepared by experts from Japan
to be considered by the
Technical Working Party for Vegetables
at its fifty-eighth session, to be held virtually
from 2024-04-22 to 2023-05-25*

Disclaimer: this document does not represent UPOV policies or guidance

Alternative names:*

<i>Botanical name</i>	<i>English</i>	<i>French</i>	<i>German</i>	<i>Spanish</i>
<i>Zingiber officinale</i> Rosc.	Ginger	Gingembre	Ingwer	Jengibre

The purpose of these guidelines ("Test Guidelines") is to elaborate the principles contained in the General Introduction (document TG/1/3), and its associated TGP documents, into detailed practical guidance for the harmonized examination of distinctness, uniformity and stability (DUS) and, in particular, to identify appropriate characteristics for the examination of DUS and production of harmonized variety descriptions.

ASSOCIATED DOCUMENTS

These Test Guidelines should be read in conjunction with the General Introduction and its associated TGP documents.

* These names were correct at the time of the introduction of these Test Guidelines but may be revised or updated. [Readers are advised to consult the UPOV Code, which can be found on the UPOV Website (www.upov.int), for the latest information.]

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1. Subject of these Test Guidelines

These Test Guidelines apply to all varieties of *Zingiber officinale* Rosc.

2. Material Required

2.1 The competent authorities decide on the quantity and quality of the plant material required for testing the variety and when and where it is to be delivered. Applicants submitting material from a State other than that in which the testing takes place must ensure that all customs formalities and phytosanitary requirements are complied with.

2.2 The material is to be supplied in the form of rhizomes.

2.3 The minimum quantity of plant material, to be supplied by the applicant, should be:

40 rhizomes with an individual weight of about 80 to 100g

2.4 The plant material supplied should be visibly healthy, not lacking in vigor, nor affected by any important pest or disease.

2.5 The plant material should not have undergone any treatment which would affect the expression of the characteristics of the variety, unless the competent authorities allow or request such treatment. If it has been treated, full details of the treatment must be given.

3. Method of Examination

3.1 *Number of Growing Cycles*

3.1.1 The minimum duration of tests should normally be two independent growing cycles.

3.1.2 The two independent growing cycles should be in the form of two separate plantings.

3.1.3 The testing of a variety may be concluded when the competent authority can determine with certainty the outcome of the test.

3.2 *Testing Place*

Tests are normally conducted at one place. In the case of tests conducted at more than one place, guidance is provided in TGP/9 "Examining Distinctness".

3.3 *Conditions for Conducting the Examination*

The tests should be carried out under conditions ensuring satisfactory growth for the expression of the relevant characteristics of the variety and for the conduct of the examination.

3.4 *Test Design*

3.4.1 Each test should be designed to result in a total of at least 30 plants, which should be divided between at least 2 replicates.

3.4.2 The design of the tests should be such that plants or parts of plants may be removed for measurement or counting without prejudice to the observations which must be made up to the end of the growing cycle.

3.5 *Additional Tests*

Additional tests, for examining relevant characteristics, may be established.

4. Assessment of Distinctness, Uniformity and Stability

4.1 *Distinctness*

4.1.1 General Recommendations

It is of particular importance for users of these Test Guidelines to consult the General Introduction prior to making decisions regarding distinctness. However, the following points are provided for elaboration or emphasis in these Test Guidelines.

4.1.2 Consistent Differences

The differences observed between varieties may be so clear that more than one growing cycle is not necessary. In addition, in some circumstances, the influence of the environment is not such that more than a single growing cycle is required to provide assurance that the differences observed between varieties are sufficiently consistent. One means of ensuring that a difference in a characteristic, observed in a growing trial, is sufficiently consistent is to examine the characteristic in at least two independent growing cycles.

4.1.3 Clear Differences

Determining whether a difference between two varieties is clear depends on many factors, and should consider, in particular, the type of expression of the characteristic being examined, i.e. whether it is expressed in a qualitative, quantitative, or pseudo-qualitative manner. Therefore, it is important that users of these Test Guidelines are familiar with the recommendations contained in the General Introduction prior to making decisions regarding distinctness.

4.1.4 Number of Plants or Parts of Plants to be Examined

Unless otherwise indicated, for the purposes of distinctness, all observations on single plants should be made on 20 plants or parts of plants taken from each of 20 plants and any other observations made on all plants in the test, disregarding any off-type plants.

4.1.5 Method of Observation

The recommended method of observing the characteristic for the purposes of distinctness is indicated by the following key in the Table of Characteristics (see document TGP/9 "Examining Distinctness", Section 4 "Observation of characteristics"):

MG: single measurement of a group of plants or parts of plants

MS: measurement of a number of individual plants or parts of plants

VG: visual assessment by a single observation of a group of plants or parts of plants

VS: visual assessment by observation of individual plants or parts of plants

Type of observation: visual (V) or measurement (M)

"Visual" observation (V) is an observation made on the basis of the expert's judgment. For the purposes of this document, "visual" observation refers to the sensory observations of the experts and, therefore, also includes smell, taste and touch. Visual observation includes observations where the expert uses reference points (e.g. diagrams, example varieties, side-by-side comparison) or non-linear charts (e.g. color charts). Measurement (M) is an objective observation against a calibrated, linear scale e.g. using a ruler, weighing scales, colorimeter, dates, counts, etc.

Type of record: for a group of plants (G) or for single, individual plants (S)

For the purposes of distinctness, observations may be recorded as a single record for a group of plants or parts of plants (G), or may be recorded as records for a number of single, individual plants or parts of plants (S). In most cases, "G" provides a single record per variety and it is not possible or necessary to apply statistical methods in a plant-by-plant analysis for the assessment of distinctness.

In cases where more than one method of observing the characteristic is indicated in the Table of Characteristics (e.g. VG/MG), guidance on selecting an appropriate method is provided in document TGP/9, Section 4.2.

4.2 *Uniformity*

- 4.2.1 It is of particular importance for users of these Test Guidelines to consult the General Introduction prior to making decisions regarding uniformity. However, the following points are provided for elaboration or emphasis in these Test Guidelines:
- 4.2.2 These Test Guidelines have been developed for the examination of vegetatively propagated varieties. For varieties with other types of propagation, the recommendations in the General Introduction and document TGP/13 "Guidance for new types and species" Section 4.5 "Testing Uniformity" should be followed.
- 4.2.3 For the assessment of uniformity of vegetatively propagated varieties, a population standard of 1% and an acceptance probability of at least 95% should be applied. In the case of a sample size of 30 plants, 1 off-type is allowed.

4.3 *Stability*

- 4.3.1 In practice, it is not usual to perform tests of stability that produce results as certain as those of the testing of distinctness and uniformity. However, experience has demonstrated that, for many types of variety, when a variety has been shown to be uniform, it can also be considered to be stable.
- 4.3.2 Where appropriate, or in cases of doubt, stability may be further examined by testing a new plant stock to ensure that it exhibits the same characteristics as those shown by the initial material supplied.

5. Grouping of Varieties and Organization of the Growing Trial

- 5.1 The selection of varieties of common knowledge to be grown in the trial with the candidate varieties and the way in which these varieties are divided into groups to facilitate the assessment of distinctness are aided by the use of grouping characteristics.
- 5.2 Grouping characteristics are those in which the documented states of expression, even where produced at different locations, can be used, either individually or in combination with other such characteristics: (a) to select varieties of common knowledge that can be excluded from the growing trial used for examination of distinctness; and (b) to organize the growing trial so that similar varieties are grouped together.
- 5.3 The following have been agreed as useful grouping characteristics:
- (a) Plant: height (characteristic 2)
 - (b) Plant: number of stems (characteristic 3)
 - (c) Stem: anthocyanin coloration (characteristic 11)
 - (d) Rhizome: size of sections (characteristic 17)
- 5.4 Guidance for the use of grouping characteristics, in the process of examining distinctness, is provided through the General Introduction and document TGP/9 "Examining Distinctness".

6. Introduction to the Table of Characteristics

6.1 *Categories of Characteristics*

6.1.1 Standard Test Guidelines Characteristics

Standard Test Guidelines characteristics are those which are approved by UPOV for examination of DUS and from which members of the Union can select those suitable for their particular circumstances.

6.1.2 Asterisked Characteristics

Asterisked characteristics (denoted by *) are those included in the Test Guidelines which are important for the international harmonization of variety descriptions and should always be examined for DUS and included in the variety description by all members of the Union, except when the state of expression of a preceding characteristic or regional environmental conditions render this inappropriate.

6.2 States of Expression and Corresponding Notes

6.2.1 States of expression are given for each characteristic to define the characteristic and to harmonize descriptions. Each state of expression is allocated a corresponding numerical note for ease of recording of data and for the production and exchange of the description.

6.2.2 All relevant states of expression are presented in the characteristic.

6.2.3 Further explanation of the presentation of states of expression and notes is provided in document TGP/7 "Development of Test Guidelines".

6.3 Types of Expression

An explanation of the types of expression of characteristics (qualitative, quantitative and pseudo-qualitative) is provided in the General Introduction.

6.4 Example Varieties

Where appropriate, example varieties are provided to clarify the states of expression of each characteristic.

6.5 Legend

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
1	2	3	4	5	6	7	
	Name of characteristics in English						
	states of expression						

1 Characteristic number

2 (*) Asterisked characteristic – see Chapter 6.1.2

3 Type of expression

QL Qualitative characteristic – see Chapter 6.3

QN Quantitative characteristic – see Chapter 6.3

PQ Pseudo-qualitative characteristic – see Chapter 6.3

4 Method of observation (and type of plot, if applicable)

MG, MS, VG, VS – see Chapter 4.1.5

5 (+) See Explanations on the Table of Characteristics in Chapter 8.2

6 (a)-(d) See Explanations on the Table of Characteristics in Chapter 8.1

7 Not applicable

7. Table of Characteristics/Tableau des caractères/Merkmalstabelle/Tabla de caracteres

	English		français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
1.	QN	VG	(a)				
	Plant: growth habit						
		upright				Kintoki	1
		upright to semi-upright					2
		semi-upright				Sanshu	3
		semi-upright to spreading					4
		spreading					5
2. (*)	QN	MS/VG	(+)	(b)			
	Plant: height						
		very short					1
		very short to short					2
		short					3
		short to medium					4
		medium					5
		medium to long					6
		long					7
		long to very long					8
		very long					9
3. (*)	QN	MS/VG	(b)				
	Plant: number of stems						
		very few					1
		very few to few					2
		few				Tosadai Shouga	3
		few to medium					4
		medium				Sanshu	5
		medium to many					6
		many				Kintoki	7
		many to very many					8
		very many					9

	English		français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
4.	QN	MS/VG	(b)				
	Plant: number of leaves on main stem						
		very few					1
		few					2
		medium					3
		many					4
		very many					5
5.	QN	VG	(+)	(b)			
	Leaf: attitude of top leaf						
		erect				Yanaka	1
		erect to semi-erect					2
		semi-erect				Sanshu	3
		semi-erect to horizontal					4
		horizontal				Tosadai Shouga	5
6. (*)	QN	MS/VG	(+)	(b)			
	Leaf: length						
		very short					1
		short					2
		medium					3
		long					4
		very long					5
7. (*)	QN	MS/VG	(+)	(b)			
	Leaf: width						
		very narrow					1
		narrow					2
		medium					3
		broad					4
		very broad					5

	English		français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
8.	(*)	QN	VG	(b)			
		Leaf: intensity of green color					
		very light					1
		light					2
		medium					3
		dark					4
		very dark					5
9.	(*)	QN	MS/VG	(+)	(b)		
		Stem: diameter					
		very thin					1
		thin					2
		medium					3
		thick					4
		very thick					5
10		QN	VG	(+)	(b)		
		Stem: intensity of green color					
		very light					1
		light					2
		medium					3
		dark					4
		very dark					5
11	(*)	QN	VG	(b)			
		Stem: anthocyanin coloration					
		absent or very weak					1
		very weak to weak					2
		weak				Sanshu	3
		weak to medium					4
		medium				Yanaka	5
		medium to strong					6
		strong				Kintoki	7
		strong to very strong					8
		very strong					9

	English		français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
12	(*)	QN	MS	(d)			
		Rhizome: total weight					
		very low					1
		very low to low					2
		low				Sanshu	3
		low to medium					4
		medium				Kintoki	5
		medium to high					6
		high					7
		high to very high					8
		very high					9
13	(*)	PQ	VG	(+)	(d)		
		Rhizome: skin color					
		yellowish white				Sanshu	1
		greyish yellow				Tosadai Shouga	2
		reddish yellow				Kintoki	3
		reddish brown				Akashouga	4
14		QN	VG	(d)			
		Rhizome: roughness of surface					
		very smooth					1
		smooth					2
		medium					3
		rough					4
		very rough					5
15		QN	VG	(d)			
		Rhizome: anthocyanin coloration of bud					
		absent or very weak					1
		very weak to weak					2
		weak				Sanshu	3
		weak to medium					4
		medium				Yanaka	5
		medium to strong					6
		strong				Kintoki	7
		strong to very strong					8
		very strong					9

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
16	(*)	QN	MS/VG	(d)		
	Rhizome: number of sections					
	very few					1
	very few to few					2
	few				Tosadai Shouga	3
	few to medium					4
	medium				Sanshu	5
	medium to many					6
	many					7
	many to very many					8
	very many				Kintoki	9
17	(*)	QN	VG	(d)		
	Rhizome: size of sections					
	very small					1
	small					2
	medium					3
	large					4
	very large					5
18		QN	VG	(+)	(d)	
	Rhizome: density of sections					
	very sparse					1
	sparse					2
	medium					3
	dense					4
	very dense					5
19		QN	VG	(d)		
	Rhizome: intensity of yellow color of flesh					
	very light					1
	light					2
	medium					3
	dark					4
	very dark					5

	English		français		deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
20	QN	MG/VG	(+)	(c)				
	Time of sprouting							
		very early						1
		early						2
		medium						3
		late						4
		very late						5
21	QN	MG/VG	(+)	(d)				
	Time of harvest maturity							
		very early						1
		early						2
		medium						3
		late						4
		very late						5

8. Explanations on the Table of Characteristics

8.1 *Explanations covering several characteristics*

Characteristics containing the following key in the Table of Characteristics should be examined as indicated below:

- (a) Observations should be made at the time when the growth indicate most vigorously.
- (b) Observations should be made before the end of the growing phase.
- (c) Observations should be made at the time of sprouting.
- (d) Observations should be made at the time of harvesting when the color of leaves starts to turn yellow.

8.2 *Explanations for individual characteristics*

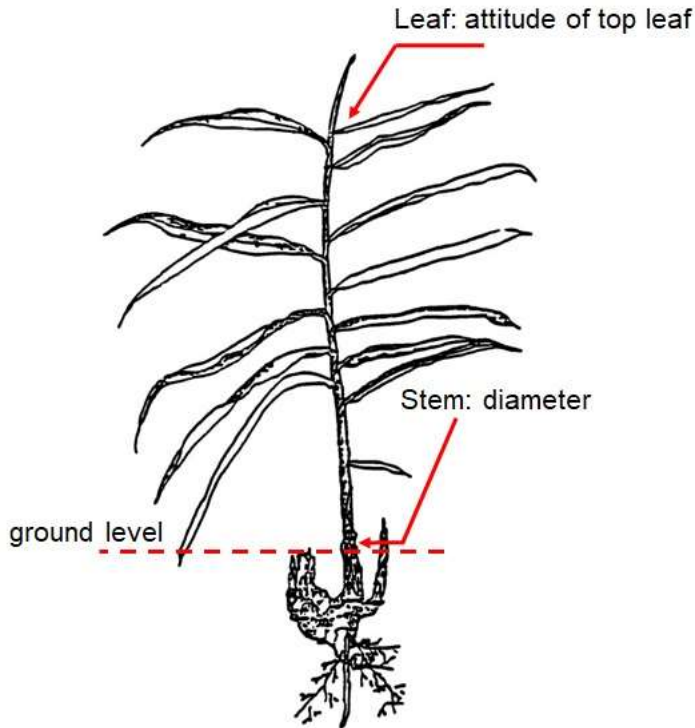
Ad. 2: Plant: height

Observation should be made on the height from ground level to top of the main stem.



Ad. 5: Leaf: attitude of top leaf

Observation should be made on the attitude of the fully developed top leaf of the main stem.



Ad. 6: Leaf: length

Observation or measurement should be made on the largest leaf taken from the upper third of the main stem.



Ad. 7: Leaf: width

See Ad.6.

Ad. 9: Stem: diameter

See Ad.5.

Observation or measurement should be made on the diameter of the main stem (including the leaf sheath) at broadest point.

Ad. 10: Stem: intensity of green color

Observation should be made on the stem including the leaf sheath.

Ad. 13: Rhizome: skin color

Observation should be made on color of skin excluding anthocyanin coloration of buds.



1
yellowish white



2
greyish yellow



3
reddish yellow



4
reddish brown

Ad. 18: Rhizome: density of sections



1
very sparse



3
medium



5
very dense

Ad. 20: Time of sprouting

The time of sprouting is when 50% of the plants begin to sprout.

Ad. 21: Time of harvest maturity

The time of harvest maturity is when 50% of the plants have reached the yellowing stage of the leaves.

9. Literature

Aoki, H., 1996: Nogyogijutsu-taiei (Vegetable. Volume11), Shadanhojin Nousan-gyoson-bunkakyokai. Tokyo, JP, pp. 227 to 248

Ishii, Y., Tamura, S., 1972: Saishin-Engeidaijiten (Volume5), Seibundo Shinkosha Publishing Co.,Ltd. Tokyo, JP, pp. 2747 to 2749

Bown, D., 1997: The Royal Horticultural Society Herbs-daihyakka, Seibundo Shinkosha Publishing Co.,Ltd. Tokyo, JP, pp. 373

10. Technical Questionnaire

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:
		Application date: (not to be filled in by the applicant)
TECHNICAL QUESTIONNAIRE to be completed in connection with an application for plant breeders' rights		
1. Subject of the Technical Questionnaire		
1.1	Botanical name	<input type="text" value="Zingiber officinale Rosc."/>
1.2	Common name	<input type="text" value="Ginger"/>
2. Applicant		
	Name	<input type="text"/>
	Address	<input type="text"/>
	Telephone No.	<input type="text"/>
	Fax No.	<input type="text"/>
	E-mail address	<input type="text"/>
	Breeder (if different from applicant)	<input type="text"/>
3. Proposed denomination and breeder's reference		
	Proposed denomination (if available)	<input type="text"/>
	Breeder's reference	<input type="text"/>

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:
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#4. Information on the breeding scheme and propagation of the variety

4.1 Breeding scheme

Variety resulting from:

4.1.1 Crossing

(a) controlled cross []

(b) partially known cross []

(c) unknown cross []

4.1.2 Mutation []
(please state parent variety)

4.1.3 Discovery and development []
(please state where and when discovered and how developed)

4.1.4 Other []
(Please provide details)

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:
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4.2	Method of propagating the variety	
4.2.1	Vegetative propagation	
(a)	Rhizomes	[]
(b)	Other (state method)	[]
<input type="text"/>		
4.2.2	Other (Please provide details)	[]
<input type="text"/>		

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:
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5. Characteristics of the variety to be indicated (the number in brackets refers to the corresponding characteristic in Test Guidelines; please mark the note which best corresponds).

Characteristics	Example Varieties	Note
5.1 Plant: height (2)		
very short		1 []
very short to short		2 []
short		3 []
short to medium		4 []
medium		5 []
medium to long		6 []
long		7 []
long to very long		8 []
very long		9 []
5.2 Plant: number of stems (3)		
very few		1 []
very few to few		2 []
few	Tosadai Shouga	3 []
few to medium		4 []
medium	Sanshu	5 []
medium to many		6 []
many	Kintoki	7 []
many to very many		8 []
very many		9 []
5.3 Leaf: length (6)		
very short		1 []
short		2 []
medium		3 []
long		4 []
very long		5 []

Characteristics	Example Varieties	Note
5.4 Leaf: width (7)		
very narrow		1 []
narrow		2 []
medium		3 []
broad		4 []
very broad		5 []
5.5 Leaf: intensity of green color (8)		
very light		1 []
light		2 []
medium		3 []
dark		4 []
very dark		5 []
5.6 Stem: diameter (9)		
very thin		1 []
thin		2 []
medium		3 []
thick		4 []
very thick		5 []
5.7 Stem: anthocyanin coloration (11)		
absent or very weak		1 []
very weak to weak		2 []
weak	Sanshu	3 []
weak to medium		4 []
medium	Yanaka	5 []
medium to strong		6 []
strong	Kintoki	7 []
strong to very strong		8 []
very strong		9 []

Characteristics	Example Varieties	Note
5.8 Rhizome: total weight (12)		
very low		1 []
very low to low		2 []
low	Sanshu	3 []
low to medium		4 []
medium	Kintoki	5 []
medium to high		6 []
high		7 []
high to very high		8 []
very high		9 []
5.9 Rhizome: skin color (13)		
yellowish white	Sanshu	1 []
greyish yellow	Tosadai Shouga	2 []
reddish yellow	Kintoki	3 []
reddish brown	Akashouga	4 []
5.10 Rhizome: number of sections (16)		
very few		1 []
very few to few		2 []
few	Tosadai Shouga	3 []
few to medium		4 []
medium	Sanshu	5 []
medium to many		6 []
many		7 []
many to very many		8 []
very many	Kintoki	9 []
5.11 Rhizome: size of sections (17)		
very small		1 []
small		2 []
medium		3 []
large		4 []
very large		5 []

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:
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6. Similar varieties and differences from these varieties

Please use the following table and box for comments to provide information on how your candidate variety differs from the variety (or varieties) which, to the best of your knowledge, is (or are) most similar. This information may help the examination authority to conduct its examination of distinctness in a more efficient way.

Denomination(s) of variety(ies) similar to your candidate variety	Characteristic(s) in which your candidate variety differs from the similar variety(ies)	Describe the expression of the characteristic(s) for the similar variety(ies)	Describe the expression of the characteristic(s) for your candidate variety
<i>Example</i>	<i>Plant: height</i>	<i>short</i>	<i>medium</i>

Comments:

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:
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#7. Additional information which may help in the examination of the variety

7.1 In addition to the information provided in sections 5 and 6, are there any additional characteristics which may help to distinguish the variety?

Yes No

(If yes, please provide details)

7.2 Are there any special conditions for growing the variety or conducting the examination?

Yes No

(If yes, please provide details)

7.3 Other information

A representative color photograph of the variety displaying its main distinguishing feature(s), should accompany the Technical Questionnaire. The photograph will provide a visual illustration of the candidate variety which supplements the information provided in the Technical Questionnaire.

The key points to consider when taking a photograph of the candidate variety are:

- Indication of the date and geographic location
- Correct labeling (breeder's reference)
- Good quality printed photograph (minimum 10 cm x 15 cm) and/or sufficient resolution electronic format version (minimum 960 x 1280 pixels)

Further guidance on providing photographs with the Technical Questionnaire is available in document TGP/7 "Development of Test Guidelines", Guidance Note 35 (<http://www.upov.int/tgp/en/>).

[The link provided may be deleted by members of the Union when developing authorities' own test guidelines.]

Resistance to pests and diseases

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:
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8. Authorization for release

(a) Does the variety require prior authorization for release under legislation concerning the protection of the environment, human and animal health?

Yes [] No []

(b) Has such authorization been obtained?

Yes [] No []

If the answer to (b) is yes, please attach a copy of the authorization.

9. Information on plant material to be examined or submitted for examination

9.1 The expression of a characteristic or several characteristics of a variety may be affected by factors, such as pests and disease, chemical treatment (e.g. growth retardants or pesticides), effects of tissue culture, different rootstocks, scions taken from different growth phases of a tree, etc.

9.2 The plant material should not have undergone any treatment which would affect the expression of the characteristics of the variety, unless the competent authorities allow or request such treatment. If the plant material has undergone such treatment, full details of the treatment must be given. In this respect, please indicate below, to the best of your knowledge, if the plant material to be examined has been subjected to:

(a) Microorganisms (e.g. virus, bacteria, phytoplasma)	Yes []	No []
(b) Chemical treatment (e.g. growth retardant, pesticide)	Yes []	No []
(c) Tissue culture	Yes []	No []
(d) Other factors	Yes []	No []

Please provide details for where you have indicated "yes".

.....

10. I hereby declare that, to the best of my knowledge, the information provided in this form is correct:

Applicant's name

Signature Date

[End of document]